ARMY RESEARCH LABORATORY

Cold Environment Assessment Tool (CEAT) User's Guide

by David Sauter

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Army Research Laboratory
White Sands Missile Range, NM 88002

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14. ABSTRACT
Working in cold environments can adversely impact Soldier effectiveness and may result in serious health effects or even death. This technical note describes an easy to use mobile application that can be used to provide guidance to help mitigate these effects.

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cold effects, Soldier effectiveness

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1. Introduction

In the decade beginning in 2000, there was an average of over 350 cold-weather related injuries in the Army every year (Arneson-Baker, 2010). The Cold Environment Assessment Tool (CEAT) Web browser application (from here on also referred to as the "app") attempts to address this issue by providing guidance regarding cold-weather training and missions as a function of air temperature, wind speed, and work intensity. CEAT is based on information found in the "Prevention and Management of Cold-Weather Injuries" Technical Bulletin (TB) Medical 508 (Department of the Army, 2005) and the "Field Hygiene and Sanitation" Field Manual (FM) 21-10 (Department of the Army, 2000). Output consists of the computed wind chill temperature (National Weather Service, 2013), the time until frostbite, and recommended preventive measures. CEAT runs on a number of Web browsers currently available for mobile devices to include those based on Android, the iPhone* Operating System (iOS), and Windows† Mobile. As there are a vast number of screen resolutions and browser choice combinations in the mobile market, it cannot be guaranteed that CEAT will run and/or display appropriately on all. Although not specifically designed for desktop or laptop systems, it will also run on browsers hosted on those devices.

CEAT was developed for mobile devices to address the issue of adverse impacts due to the cold. Availability on a mobile device ensures that this guidance is readily available at lower echelons and/or remote locations where laptop or desktop computing platforms and/or network connections back to a higher echelon (from which guidance would likely be disseminated) are not available. For a more detailed discussion of mobile Android device relevance to the military see, "Android Smartphone Relevance to Military Weather Applications" (Sauter, 2011).

2. CEAT Inputs

To launch CEAT, enter the location of the CEAT.html file into the browser address bar. This will launch the application and display the initial tab ("INPUT") to allow entry of the temperature, wind speed, and work intensity values (figure 1). Upon tapping within either the "Temperature" or "Wind Speed" input boxes, a virtual keyboard will appear at the bottom of the screen to allow entry of a value (figure 2). Upon successful editing of the temperature or wind speed to a valid entry, the wind chill value will be recomputed and displayed. Invalid entries (e.g., a non-numeric character other than "-" for temperature) are error trapped (figure 3). Lastly,

*iPhone is a registered trademark of Apple Inc.

†Windows is a registered trademark of Microsoft.

the user may edit the “Work Intensity” value via a drop down menu list to set the appropriate work rate (figure 4). FM 21-10 defines the three work intensity levels as:

- Sedentary: sentry duty, eating, resting, sleeping, clerical work
- Low: walking, marching without rucksack, drill and ceremony
- High: digging foxhole, running, marching with rucksack, making or breaking bivouac

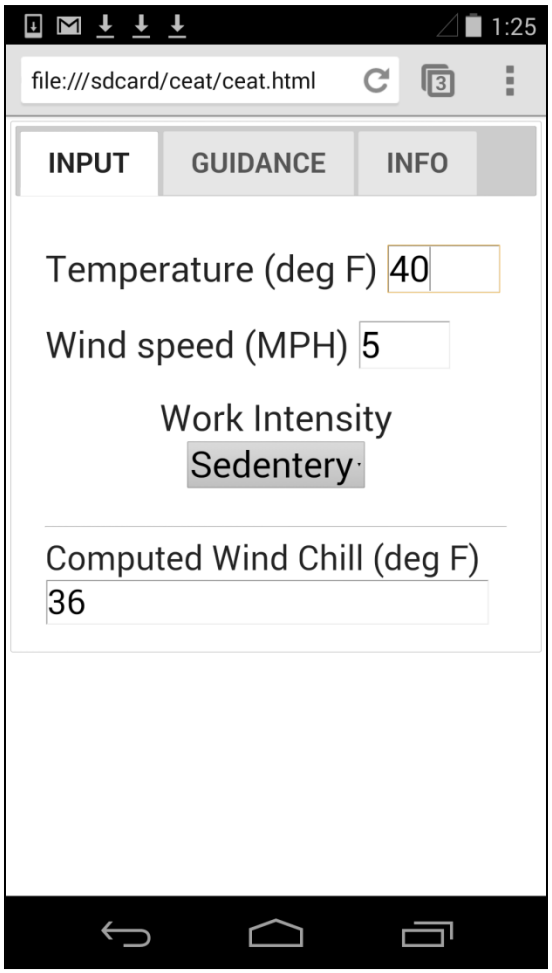

Figure 1. Launch CEAT.

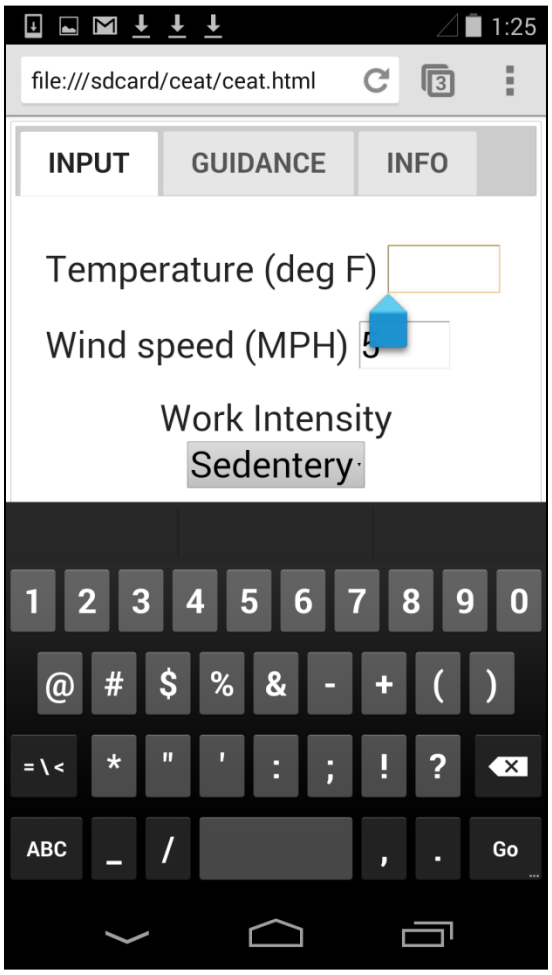

Figure 2. Virtual keyboard.

Figure 3. Invalid temperature entry.

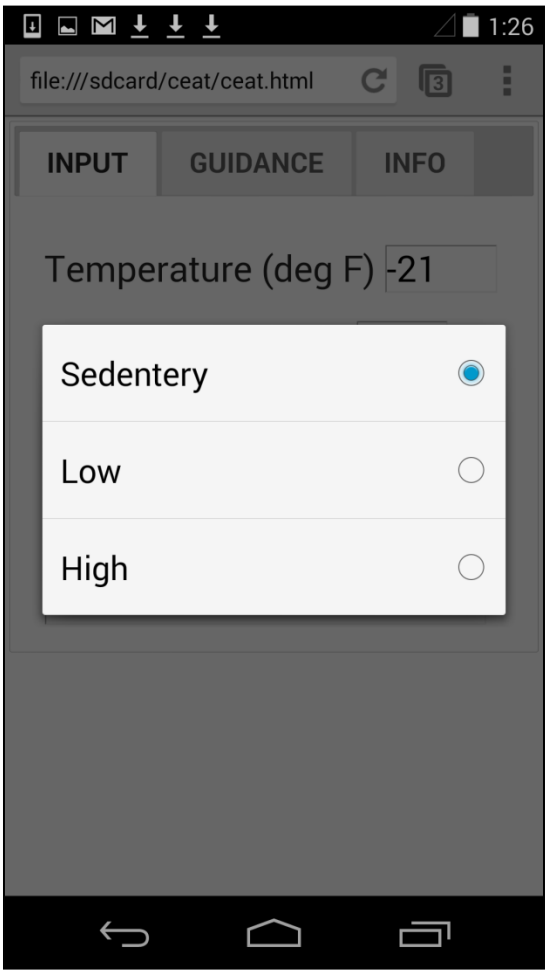

Figure 4. Work intensity.

After the desired changes have been made to the Input screen, tapping the “Guidance” tab will result in the “Time until Frostbite (minutes)” and “Preventive Measures” information being determined and displayed (figure 5). Note that the “Time until Frostbite (minutes)” represents the time “until the occurrence of cheek frostbite in the most susceptible 5 percent of personnel” (per TB MED 508). Also, it may be necessary to vertically scroll the “Preventive Measures” window to see all of the guidance.

The last tab (“INFO”) provides the POC information for the app as well as the version and date of the app (figure 6). On many browsers, simply tapping the POC name at the bottom of the screen will pop up a message box allowing the launch of an email program such that the POC can be contacted (figure 7).

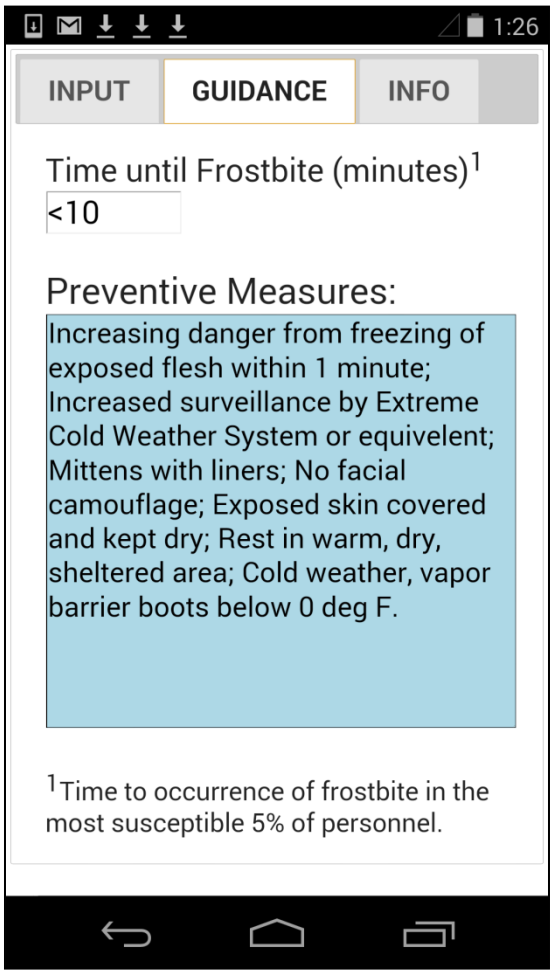

Figure 5. Guidance.

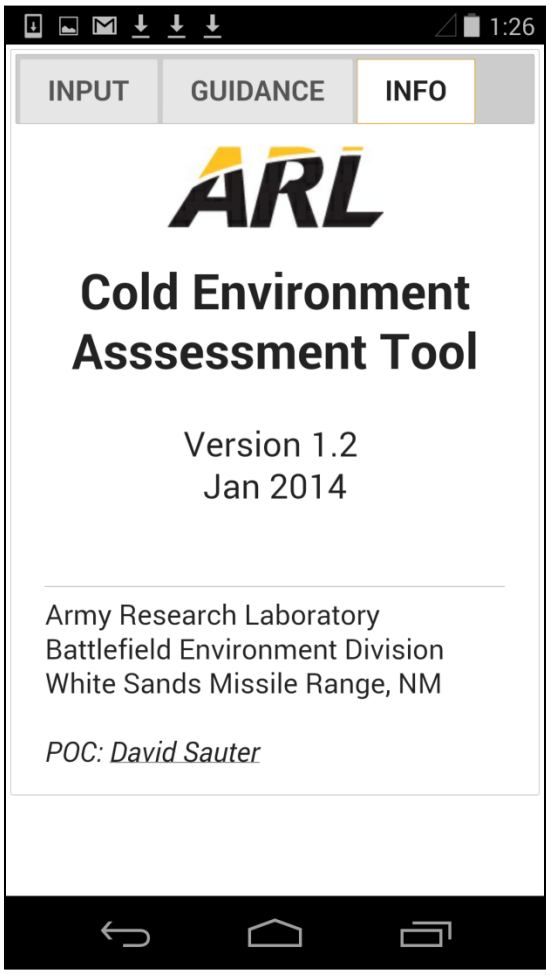

Figure 6. Information.

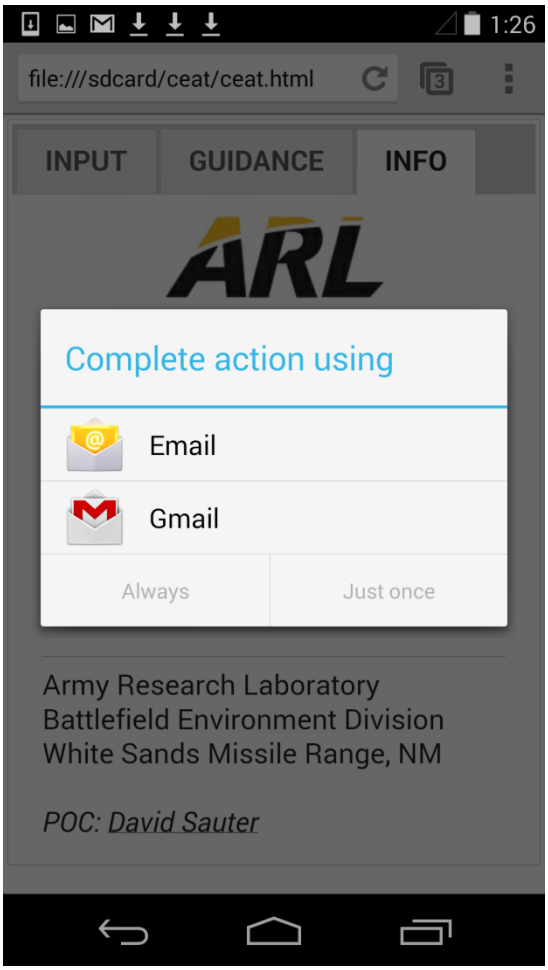

Figure 7. Contacting POC.

3. Summary and Conclusions

CEAT provides easy to use and readily understood guidance regarding personnel training or operations in a cold-weather environment. Output is based on information found in an Army FM and TB while the wind chill temperature is computed from a widely used National Weather Service formula. Hosting on a mobile device should make it accessible virtually anywhere in a tactical or training environment.

Final internal testing and evaluation of CEAT is anticipated in 2014. It will then be transitioned to the Defense Information Systems Agency's (DISA) Mobile Application Store (MAS), which is slated for deployment in the summer of 2014. Via the MAS, Department of Defense (DOD) individuals will be allowed access to the CEAT app for their use.

4. References

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List of Symbols, Abbreviations, and Acronyms

CEAT	Cold Environment Assessment Tool
DISA	Defense Information Systems Agency
DOD	Department of Defense
FM	Field Manual
iOS	iPhone Operating System
MAS	Mobile Application Store
TB	Technical Bulletin

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